

How to Use an MSDS for Air Pollution Control Requirements

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Any raw materials that a business might use to create a product may also, in the process, create air pollution. Air pollution from a business may be regulated under one of the air pollution control requirements that are carried out and enforced by the Department of Natural Resources' (DNR) Bureau of Air Management (or Air Program). A tool often recommended as a resource to determine if your raw materials may create air pollution is the Material Safety Data Sheet (MSDS) provided by the material's supplier or manufacturer. There is no consistent format for MSDS, so this sheet will attempt to show you how to determine if your materials will create air pollution and in what quantities.

What Is In A MSDS?

The only thing consistent about the format of MSDS are the key sections of information. They all have to cover:

- ◆ what the material is;
- ◆ who makes/sells it;
- ◆ where they are located;
- ◆ why it's hazardous;
- ◆ how you can be exposed to the hazard;
- ◆ what conditions could increase the hazard;
- ◆ how to handle the material safely;
- ◆ what protection to use when handling;
- ◆ what to do when exposed;
- ◆ what to do if there's a spill or emergency.

What Do I Need to Know?

MSDS were not intended for making air pollution emissions calculations, so if you must use the data they contain it will involve multiple steps to arrive at the required information. The more appropriate document would be the **Certified Product Data Sheet** that should be available from the material's supplier or manufacturer. If it is not, then you will have to work from the MSDS.

For the air pollution control requirements, you only need the MSDS information about *what the material is* and *why it's hazardous*. This information is found in two sections of an MSDS. Those sections are the **Hazardous Ingredients/Identity** section and the **Physical/Chemical Characteristics** section.

Hazardous Ingredients/Identity

Here you will find a list of the material's hazardous components, their Chemical Abstract System (CAS) number and the amount contained within the material by percent. *Then what is usually provided is the range (i.e., n-Butyl Alcohol, 10-25% wt.) within which the material may contain that specific component in any given batch manufactured.* A more precise value for content of the individual hazardous components within the material will require a discussion with the manufacturer. The amount of each hazardous component in the material is important for a number of air pollution control requirements.

You will need to calculate specific hazardous air pollutant emission rates for:

- ◆ any air pollution permit applications,
- ◆ the state hazardous air pollutant rule, and
- ◆ reporting on your annual air emissions inventory.

If you cannot get the material supplier or manufacturer to give you a specific content value for each component to use in the emissions calculations, the highest value in the range should be used.

Physical/Chemical Characteristics

Here you find different pieces of information about the material and only a few will be of use for air pollution control requirements. The key pieces of information that you will need to use are:

- ◆ density of the material (in pounds per gallon),
- ◆ specific gravity,
- ◆ VOC Content (in weight percent or pounds per gallon, if provided at all),
- ◆ Solids Content (in weight percent).

These can provide enough information to calculate volatile organic compound (VOC) or particulate matter (PM) emissions or, when combined with the hazardous component content values, the emissions of the hazardous components.

Example Calculations

The values calculated here will provide examples of VOC emissions, PM emissions and emissions of a single hazardous air pollutant.

VOC Emissions

The data you will need for VOC emissions calculations are:

- ◆ Density OR Specific Gravity
- ◆ VOC Content OR Solids Content (in weight percent or pounds per gallon)

To calculate emissions you will also need the amount of the material used over a certain period of time.

1. If you have the density of the coating, you are set, but if not you will need to do one calculation first. Using the specific gravity, which is a comparison of the material's density to water's,

you just multiply the specific gravity by the density of water to get the value you need:

$$\text{Specific Gravity (sg)} = 0.84$$

$$\text{Density} = 0.84 \times 8.34 \text{ pounds per gallon} \\ = 7.00 \text{ pounds per gallon}$$

2. Next you need the VOC content. If you have it in units of pounds per gallon from the MSDS then you are ready to calculate emissions, but if not you may need to do one or two other calculations first. If all you have is the solids content in weight percent (% by wt.) or you need to use solids content if your VOC content is only provided in volume percent (% by vol.), the first calculation is:

$$\text{Solids Content} = 60\% \text{ by wt.}$$

$$\text{VOC Content} = 1 - (60/100) = 0.40 \times 100 = 40\% \text{ by wt.}$$

You want to end up with VOC content in pounds per gallon to calculate emissions. So you multiply the VOC content in weight percent by the density of the material:

$$\text{VOC Content} = (40/100) \times 7.00 \text{ lb/gal} = 2.80 \text{ pounds per gallon}$$

3. Although that is just one material, we will assume it is the only one used. To calculate the emissions, you multiply the VOC content by the number of gallons used. If one used 50 gallons in a month, the emissions would be:

$$\text{VOC Emissions} = 50 \text{ gal/mo} \times 2.8 \text{ lb VOC/gal} \\ = 140 \text{ pounds VOC per month}$$

If you have multiple materials used, you need to know the amount for each one and the VOC content for each one as well. Here is what a multiple material calculation looks like:

$$\#1 = 50 \text{ gal/mo} \times 2.8 \text{ lb VOC/gal} = 140 \text{ lb/mo}$$

$$\#2 = 75 \text{ gal/mo} \times 3.6 \text{ lb VOC/gal} = 270 \text{ lb/mo}$$

$$\#3 = 15 \text{ gal/mo} \times 5.4 \text{ lb VOC/gal} = 81 \text{ lb/mo}$$

$$\text{TOTAL VOC emissions}$$

$$= 140 + 270 + 81 = 491 \text{ lb VOC/mo}$$

PM Emissions

Calculation of PM emissions is similar to VOCs.

You need:

- ◆ Density OR Specific Gravity
- ◆ Solids Content (in weight percent or pounds per gallon)

- ◆ Amount of Material Used

It is less likely that you will be provided the solids content in pounds per gallon on an MSDS than the VOC content.

1. The density calculation is the same as for VOC if it's needed.
2. Using the solids content of 60% by wt. again, you want to end up with solids content in pounds per gallon to calculate emissions. So you multiply the solids content in weight percent by the density of the material:

$$\text{Solids Content} = (60/100) \times 7.00 \text{ lb/gal} \\ = 4.20 \text{ pounds per gallon}$$

3. Calculating the PM emissions is then the same process as VOCs. Multiply the solids content by the amount of material used:

$$\text{PM Emissions} = 50 \text{ gal/mo} \times 4.2 \text{ lb PM/gal} \\ = 210 \text{ pounds PM per month}$$

This is often used in calculations for paints or coatings where there is actually a certain percentage of the solids that are left on the part being painted, and that is called the transfer efficiency of the application method used.

If the application method (electrostatic for this

example) is known to have a transfer efficiency of 60%, then the true emission rate would be:

$$\text{PM Emissions} = 210 \text{ lb PM/mo} \times (1 - \{60/100\}) \\ = 84 \text{ lb PM/mo}$$

Hazardous Air Pollutant Emissions

The hazardous air pollutant (HAP) emission calculations is very similar to the others.

1. Again, the density calculation is the same as for VOC's.
2. Using the example of the range given at 10-25% by wt. of n-Butyl Alcohol, you have to use the high end if the supplier or manufacturer will not give a more specific value.

$$\text{HAP Content} = (25/100) \times 7.00 \text{ lb/gal} \\ = 1.75 \text{ lb HAP/gal}$$

3. Calculating the emissions is the same process as the others from here:

$$\text{HAP Emissions} = 50 \text{ gal/mo} \times 1.75 \text{ lb HAP/gal} \\ = 87.5 \text{ lb HAP/mo}$$

One other important piece of information about the hazardous compounds listed on an MSDS is that not all of them are regulated by either DNR or the US Environmental Protection Agency (EPA) as HAPs. Attached you will find a list of the regulated HAPs, organized by CAS # so that you can match them with the compounds listed on your MSDS. The CAS# is the best match because many compounds have multiple common names that can make it confusing.



Contacts for More Information or Assistance.

The Small Business Clean Air Assistance Program helps smaller businesses understand and comply with the Clean Air Act regulations. Contact one of the program's Clean Air Specialists for more assistance: Renée Lesjak Bashel at 608/264-6153 or Tom Coogan at 608/267-9214.



For further information on MSDS you can also contact your DNR Regional or Service Center office shown on the **DNR Contact Fact Sheet**.